

# Towards healthier & sustainable food systems in ...an urbanising world

Findings and recommendations from Expert Seminar held on 19-10-2018 at WICC, Wageningen



## Authors

Lokers, R. M., Plaisier, C., Ruben, R., Venema, G. S., Herens, M., Bosch, D., Haas de, W., Dekker-Dijkxhoorn, M., Linderhof, V., Groot, J., Achterberg, T. & Stuiver, M.  
19 October 2018

## Background

We are currently facing the challenge to improve access to food and healthier diets, in a rapidly urbanising world with changing lifestyles that meet environmental constraints. These challenges are intimately linked to the Sustainable Development Goals (SDGs) and also respond to major transitions that are taking place in our main domains of food and the living environment.

The food systems approach starts from consumer and diet and works backwards to production. As the approach is multi-disciplinary, has attention for all the relevant interactions and actors, it provides insights in trade-offs, synergies and feedbacks loops. While being complex at analytical level, the added value of the Food Systems approach is its central focus on outcomes in terms of healthier diets and improved nutrition. The food systems approach responds to the global challenge of feeding the growing population with healthy and safe foods while taking into account limitations with respect to natural resources and climate change. Food systems analysis is based on thorough understanding of the structure and dynamics of agro-food production systems and value chains, including key incentives for healthier and more sustainable consumer choices.

Growing urbanization and gradually rising incomes lead to rapid changes in consumption patterns. In emerging economies, prospects for investments in upgrading of local food systems are increasing. There are major opportunities for strengthening circularity in (semi-)perishable food value chains while rigorously re-using water, food waste and side-streams. Local and regional food platforms that simultaneously engage public, private and civic stakeholders enable such coordinated efforts towards food system upgrading.

The seminar was organized in close cooperation between the two Wageningen Research programs on 'Global Food & Nutrition Security (KB22) led by Jan Verhagen and Ruerd Ruben, and 'Metropolitan Solutions' (KB25) led by Marian Stuiver and Gabe Venema. Core funding from the Ministry of Agriculture, Nature & Food Quality (LNV) enabled to develop these strategic research lines that are considered critical for addressing key knowledge requirements in public policy making as well as for private sector investments.

## Summary of key messages

- The transition towards a food system approach, from production-oriented research to a central position for consumers and diet, also means a change in thinking for scientists and policy makers.

- 
- New challenges arise from rapid urbanization (are we able to feed the mega-cities), food prices & volatility (healthy foods are more expensive), climate change (changing sourcing locations of food) and the Protein Transition (substitution of animal proteins).
  - Sustainable Food systems have to function within the limits of our natural resources: healthy diets should be realized through sustainable food systems
  - Simplification can be achieved by dividing the system up into manageable pieces. Sharing the insight from separate models provide is often better than fully linking them up.
  - Dynamic food systems analysis needs better integration of social and agricultural sciences with knowledge on health and nutrition, linking also with insights on governance and incentives,
  - There is a lack of reliable data on consumer behaviour (what people eat, where they get it, to which incentives they will react).
  - We still need to enhance our fundamental insights in food system change through (a) better understanding of trade-offs between sustainable & Healthier Diets (WR KB 2019-2022), (b) doing experiments on what interventions work in different setting, and (c) the balance between push (food environment) and pull (demand-side incentives) for food systems upgrading.

For an impression of the day see the [Seminar movie](#)

## Seminar report

### Welcome address

Jack van der Vorst, General Director of the Social Sciences Group of Wageningen of University & Research opened the workshop. The two co-organising research programmes Global Food & Nutrition Security (KB22) and Metropolitan Solutions (KB25) were introduced.

Improving access to food and healthier diets, and doing that in a rapidly urbanising world with changing urban lifestyles is an upcoming challenging. This can only be undertaken using a food systems approach, where food consumption and food production are intimately linked to markets and institutions, and decisions are driven by social norms and human behaviour.

### Opening statements

*Food systems for healthier diets | John McDermott (director A4NH Washington)*

Food systems are shaped by consumption and demand, not by supply. This is sometimes difficult to get across in the agricultural community. In rapidly urbanising food systems, a much greater proportion of the value added and the work takes place at stages close to consumption: food preparation, logistics etc. Food environments and consumptive behaviours are changing rapidly. Knowledge on how to nudge behaviour therefore has potentially large impact.

To deal with the complexity of food systems we need to simplify, to break down the food system into groups of elements. The elements of Sustainable Development Goal 2.1, focussing on accessible, nutritious and safe food, are a good place to start.

We have to understand the trade-offs between health and sustainability. For overcoming trade-offs, we have to move with the system and adopt risk-based approaches. The hazard control approach we use in developed countries wouldn't work in a lot of low-income countries: if 5% of food does not meet standards it's a food hazard problem, if 90% does not meet standards we better change the standards.

Changing consumption patterns have led to rapid increases in obesity, overweight, and related non-communicable diseases. We have seen the obesity problem coming for more than a decade,

---

yet seem almost resigned to watching it get worse. This lack of action contrasts the innovative work that researchers and policymakers have undertaken to fight undernutrition and hunger. We return to the original, unforgettable premise: food systems are driven by consumers, and what they demand. We now have an opportunity to learn and understand those demands, and act to inform decision making in a way that leads to healthier food systems for people everywhere.

*Value chain and food systems | Mark Lundy (CIAT Colombia)*

The traditional value chain approach has limitations as it focuses on a single crop at the production side, the analysis is mainly linear and it ignores the informal side of the consumer market. But there are also complementarities between value chain and food system thinking. Food systems are more about the network, value chains about bilateral linear relationships. The capture of economic value remains critical, but the question is how to understand it within the system context.

Working backwards from the consumer food plate is a potentially circular approach, closing the loop, including waste. Critical is that this food systems approach pushes us to think about trade-offs in a broader, social, environmental and health sense. Including consumption and consumers, system dynamics and feedback loops, and trying to understand how things work together, presents a huge challenge for data. How do you get data sets out of the informal market? A major risk is that we remain with assessing instead of acting, i.e. paralysis analysis. The question is: how do we move from frameworks to understand dynamics, to actual starting points for interventions? The critical issue here is engaging the actors on the ground.

For the near future we can build on existing tools, but we need to adapt them to e.g. poverty reduction, and combine them with resilience tools. Questions for future research are: how to assess, evaluate and improve the long-term as well as short-term resilience of a food system, how to use our long history of assessing environmental footprints and make that part of the food system analysis, and how to lead all of this back to nutritional outcomes.

*Sustainable food production pathways | Ken Giller (WUR)*

The rapid population increase projected for rural Africa is usually considered as a threat, as it is for instance likely to lead to political instability. But it can also be seen as an opportunity because, as developments in China and India showed, the rise and fall of rural population drives agricultural transformation.

Farming systems analysis showed that farm size is a major constraint. A survey of 13,000 household from 93 sites from 17 countries across Africa showed that 37% was food insecure, and that off-farm income becomes more and more important the smaller the farms are.

Population increase and urbanisation offers opportunities to increase this off-farm income. But the yield gap also needs to be closed. We know how to fix that, with fertiliser, technology, by more sustainable measures like crop rotation, and our knowledge can for instance also be used to adapt timing, to produce crops right in the middle of the hunger season. But for instance in an area hours away from Dar-es-Salaam we see beautifully diverse food systems in the valleys, but the uplands still produce the same amount of crops as a couple of decades ago. People's attention is on the high value (urban market and export) vegetables from which they can make money. This is the food security conundrum: national food security needs safe and nutritious food for the burgeoning urban population, but national economies rely mainly on export crops. And at the same time, rural household are reluctant farmers who lack sufficient land or economic incentives to invest in agriculture.

This is a policy problem. Urban employment and rural development need to go hand in hand to increase both off-farm income and yield, but presently the African job market is not creative

---

enough to achieve that. Therefore the growing population provides an opportunity, a driver for change, but also a threat.

*Food systems research for policy | Namukolo Covic (IFPRI Ethiopia)*

Ethiopia is urbanising at a rate of about 2% each year. Currently, foods that add to high quality diets are consumed by only a small percentage of the people. Policy instruments therefore must be aimed at making diets more diverse. Ethiopia currently has a very rich policy environment. There is no deliberate Food System approach in the policy arena, but many policies have different elements of the food system in them. Examples are the agricultural growth programme AGP2 that includes a strong objective on improving household dietary diversity, and the National Nutrition programme NNP2 which targets increasing dietary diversity, in particular looking at the nutrition status of women and children and aiming to improve nutrition service delivery. A Food & nutrition policy is coming, the idea behind it is to pull things together.

All the policies aim at a multi-sectoral approach. The main challenge has been to get the various sectors on board. There are a number of common challenges across the policy instruments, like a limited production and market diversification, alignment across sectors, accountability and the limited engagement of national academic and research institutions.

Critical questions to inform food system developments include the extent to which needs related to rapid urbanisation have been integrated into existing policy instruments, how research can help to provide solutions to the challenges in a given country, what the positive/negative trade-offs for urbanizing environments in intensifying agricultural systems and transforming food systems are and how negative trade-offs can be mitigated, what types of cold value chains and business models are appropriate within different social and ecological contexts, and which urgent sustainability issues must be addressed.



*Panel Discussion: The added value of food Systems Analysis: What difference does it make?*

The panel was chaired by Inge Brouwer (WUR). Panel members were Siemen van Berkum (WUR) for research, Patricia Wagenmakers (LNV) for policy and Carol Gribnau (HIVOS Green Society) for Civil Society.

**Main issues**

1. Food systems thinking is quite recent, but the idea that present food systems are not functioning properly and therefore need transforming does resonate at the Dutch ministry of Agriculture, Nature and Food security (LNV). The recently launched new

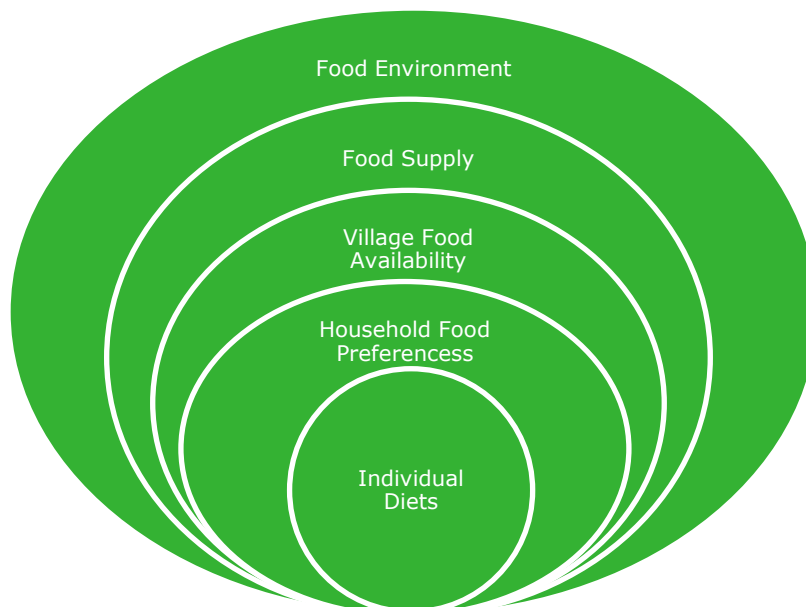
- 
- circular agriculture policy promotes a better link between agriculture and natural resources. The food systems approach also resonates with stakeholders like NGO's and farmers, at the local level. But as any new approach it does raise a lot of questions. At the same time food systems address both the challenges the global community faces, and the day to day challenges of the local community in a much more holistic system.
2. A food system transition is happening, but is not complete yet. An important point is missing: that it's all about realising that the system is wider than just agriculture and food. It's also about including natural resources, water, climate. SDG2 may be the target, but not without considering the trade-offs with other SDG's. Therefore: keep it simple, but not too simple.
  3. The crucial new aspect in food systems that will help us further is that we are in partnership with stakeholders we were not used to work with before. In food systems you have to bring all interests together. The challenge is to keep everybody on board, get results and not end up with a safe polder scenario where nothing changes.
  4. For the food system approach to really work as a game changer and lead to the transformation we need to understand better what the main drivers in a system are, how it works. Awareness raising is very critical. Food systems are very context specific and there are no easy answers. We have to let go of the quick fixes idea.
  5. Technical break-through's and innovation will not come overnight, and there is a large role for policy to induce it. Government can give a boost by changing the rules of the system, which is crucial. For the Paris climate agreement and the UN SDG's will really be followed up by concrete measures, that will be a way to make small but important steps.

### **Afternoon session**

*Introduction: The Future of Food Systems. Unfinished business & Upcoming challenges. Looking back and looking forward | Ruerd Ruben (WUR)*

We learned to start thinking back from consumption to production and to include different groups of consumers, retail networks, etc. We also learned that the behavioural change that should accompany technical innovation is not as easily achieved as we think. A third new factor is that we have to look at really different settings, and that it might be useful to specifically look at urban settings.

There is a sense of urgency: After years of progress undernourishment is for instance on the rise again. Emerging challenges are Rapid urbanization (still able to feed the mega-cities), food prices & volatility (healthy food is more expensive than unhealthy), Climate Change that affects both the production of food and the location of food in different areas, and Protein Transition (recognised by all that we need to substitute animal proteins by other proteins).



**Figure 1** Food system scheme

Diet and consumer are central in the food systems analysis, within a food environment that can be modified to induce changing behaviour. In the next layer are the supply systems, which determine how the food reaches the consumer. In the outer circle are the (policy and institutional) drivers of food system transformation.

The food systems scheme shows that the system is complex, and that there is quite a distance between drivers and diets. We can simplify the approach by using five principles:

1. Look at the dynamics of the system, understand the drivers of system performance.
2. Look for solutions within the system, and not just within the area where a problem occurs.
3. Link pathways of technical and behavioural change.
4. Look at the public, private & civic agents and their different roles in the system.
5. Always consider the implications of measures at the higher scale levels.

We still need a number of fundamental insights: better understanding of trade-offs between sustainable & Healthier Diets (WR KB 2019-2022), of what works in which setting, of the balance between push (environment) and pull (consumer demand) incentives for food systems change. It can be much more efficient to do something on the food environment side, by changing policy. We also need to better understand the roles of public and private networks for co-innovation in (mega)cities. Power in cities lies in different places, like in Dhaka (Bangladesh) the most powerful agent there is the municipal garbage removal corporation.

#### *Towards circular urban food systems | Huub Rijnaarts (WUR)*

Developed urban systems in many countries are at present completely unsustainable. Change is needed because we now deplete resources. Therefore, sustainable production, healthy food and food security are related issues. For a sustainable system, you need to include the waste part of the cycle. For a circular system we need to rearrange our infrastructure and technology, radically redesign the system. The problem is that we don't really understand how the logistics schemes function, and how we can influence it. Therefore, the basic message is: we need to integrate, we can't do it from the traditional sectoral approach anymore.

As an example: the water system. Water is crucial. For a sustainable food production the relationship with water needs to be addressed. In the local environment where water is scarce, agriculture has to be connected with waste water treatment, industrial facilities, nature



---

conservation in a more integrated technical system. But in most situations stakeholders and societal interactions are the real key to change.

There are a huge amount of factors to address, and we need an integral approach. To learn how to do that, we need to test in the real world. The Metropolitan Solutions programme does that in four living labs: Nutrient and carbon cycling in Friesland, Urban-rural resource balancing in Flevoland, Circular water provisioning in Zeeland, and resource cycling and global supply chains in central east region of The Netherlands. These four labs are also part of a new KB research proposal.

*Healthy diets for urban people | Marie Ruel (IFPRI)*



We have in fact two nutrition problems: a problem of deficiencies (undernutrition) and a problem of excess (overweight, obesity). There is more overweight and obesity in urban areas, and at the same time there are still micro-nutrient deficiencies. There is no good data, but overweight, stunting and wasting remain persistent problems we are not very good at addressing. Part of the problem is the food transition: from traditional diets of grain and vegetables to more modern diets which are more divers but include more animal sourced foods (meat, dairy), oils, refined cereals, added sugars, saturated fats, processed and ultra-processed foods.

Food environments are changing really rapidly. There are lots of places where food is on offer, there is much choice, but the problem is that we don't really know about the quality of the food on offer or about its safety. There is more aggressive promotion in urban areas. As income rises, demand changes. But the data on what people want, and on the choices they (can) actually make is not good. People search for convenience. In poor urban areas poor people often don't have cooking facilities. There is a large exposure to promotion. People now have a life style with not much physical exercise. They don't need so many calories as when working on the land, but they don't necessarily make that transition in their intake.

The little data we have shows that when income rises, other, less healthy goods are eaten. If people eat a lot of ultra-processed food, they eat very little proteins. A study over 13 European countries showed that the availability of ultra-processed food and obesity are related. And in urban areas, the poor are the least likely to be able to afford a healthy diet containing fresh food and fruits.

There is a research gap: we really don't know what people eat, we don't know where they get it, and we don't know why they make the choices they make. We have conceptual frameworks for the determinants of food choices, but we don't have the data to support them. We also have no

---

idea of what works to address the problems. There are some studies on the effects of some actions, but all in all very little is known. If we are to move forward in this area, we need to have metrics and data (we can understand). We've been talking about food systems for a number of years, but nobody is getting any answers. It is time we get them.



*Panel Discussion: Policies & Practices for Feeding Megacities*

Panel members were Arjen van Timmeren, AMS/TU Delft, Marianne van Keep, Verstegen Spices & Sauces B.V., Edith Feskens, Wageningen University & Research, Meike van Ginneken, SNV and Cindy van den Boom, Ministry of Foreign Affairs.

### **Main issues and points of discussion**

*Which lessons can the global South learn from the global North?*

There are really large differences within the Global North and South itself. In some places the Global South is already further than the Global North, more innovative. We need to be careful not to use Global North (mainly United States based research results) for the Global South. We also need to be able to learn from the differences.

*How can we connect the food system models with for instance social and health sciences models?*

You have to start somewhere, to just start from one angle. Then we need data about our very heterogeneous consumers and from different environments. But we should focus on sharing the insights of models instead of discussing too much about the models themselves. Linking different models is also cumbersome and does not necessarily provide more insights. Partial approaches can be useful as well

*There is strong political governance around food systems. How can we capitalise on that?*

By trying to get the messages across different audiences. Small-scale companies can for instance get together in platforms and start dialogues on another level than a single small company can. In a similar vein, platforms with consumers at neighbourhood level can be powerful actors vis-à-vis municipal authorities.

*How to reinforce the engagement of public and private actors?*

A message from companies and policies to research: you have to present findings in such a way that receivers are able to digest them and actually use them. Think about who your audience is and translate data and findings into understandable policy and practitioner language.

### **Ruud Ruben closes the day with three take-home messages**

---



- 
1. We need to break down some boundaries within our own organisations to bring things into practice meeting criteria of sustainability, health, circularity and nutrition.
  2. We need to work more directly with private sector, ministries and the civic sector on how local innovations and interventions can be supported by global incentives.
  3. We need to be more embedded in ongoing activities in the field. We often come in too late or as strangers. We need embedded researchers in relevant countries, organisations and industries.

*Thanks to reporter Rob Bugter, Wageningen University & Research,  
[rob.bugter@wur.nl](mailto:rob.bugter@wur.nl)*

*Presentations available upon request, Wageningen University & Research  
[christine.plaisier@wur.nl](mailto:christine.plaisier@wur.nl)*

-000-

## Synthesis parallel workshops

### Round 1: Diagnosis & Challenges

- o Sustainable food production pathways
- o Resilient and robust food value chains
- o Food systems for healthier diets

### Round 2: Implication & Partnerships

- o Sustainable urban food production
- o Transition and scenario's for food production
- o Urban consumption patterns & healthier diets

### Round 1

*Workshop 1 Sustainable food production pathways | Agricultural development pathways for viable commercial agriculture & consumption of nutritious foods*

Chair: Diane Bosch, Wageningen Centre for Development Innovation (WC DI)  
Presenters: Marion Herens, Wageningen Centre for Development Innovation (WC DI)  
Valerie Janssen and Vincent Linderhof (Wageningen Economic Research)

During the workshop the work package of pillar 1 in the Global Food Security and Nutrition programme was presented. The aim of this work package was to identify nutrition-sensitive pathways in which improved agricultural production technologies and social innovation processes can enable a more efficient use of resources in an environmentally sustainable way, can increase production of nutritious foods, and can contribute to stability and availability of nutritious foods. Two presentations highlighted the development of a conceptual framework for identifying pathways, illustrated by two case studies in Myanmar and Vietnam. Key features at multiple levels (individual, household, community and macro level) and the interactions between different levels of scale, the need for contextual understanding of adaptive strategies at farm household level. Farm households were studied in their capacity of being producer and consumer in one. Main conclusions from Myanmar, a qualitative life course study, was that diversification of livelihood strategies and socio-emotional support throughout the life course played a major role in successful farming and food and nutrition security outcomes. Main conclusions from Vietnam, a retrospective analysis of the effect of agricultural commercialization on the food security status of crop producing households in Vietnam (between 1992 and 1998), were that on the input side of commercialization a positive effect on the food variety score was observed, and on the output side a positive effect on caloric intake. Increased income was spent on non-food items, better-tasting or more diverse food, but no increase in calories was found. Overall, the observed income/livelihood diversification as a strategy challenges the general focus on specialisation in

---

agricultural production or mono-directional livelihood solutions, often advocated by agri-business and NGOs.

Using the mentimeter, the framework was reviewed by the audience. Around fifty percent agreed that the framework could be useful in guiding policy development for shaping food systems for the production and consumption of nutritious foods. Critical entry for policy development varied from education, provide economic and health incentives, creating an enabling environment, to raising consumer awareness, facilitate and promote healthier and nutritious diets. An integrated approach was emphasized. Elements, critical for policy development, missing in the framework were: simplicity, environmental outcomes and trade-offs (i.p. of shifting to plant based diets), quality criteria, sustainability criteria, producer consumer connectivity, and concrete entry points for interventions.

#### *Workshop 2 Resilient and robust food value chains*

Facilitator: Peter Ravensbergen (Wageningen Economic Research)

Presenters: Jim Groot (WFBR), Christine Plaisier, Monika Verma (Wageningen Economic Research)

During the session the work package of pillar 2 of the Global Food Security and Nutrition programme was presented. The aim during the last four years is was to develop and compare scenario's for access to safe and nutritious food through improvement and integration of value chains this with a food system perspective. Food systems are not optimal designed. Chain actors in production, processing, distribution, retail and consumption sometimes lack of providing nutritious food products at the right time, place and under the right circumstances. Food loss is one of the effects of a system that can be improved. Reducing or re-using food waste is the main focus of the majority of the projects in pillar 2. After the introduction of the pillar, the results of 3 exemplarily projects were presented.

A systems approach to Understanding Food Loss and Solutions was explained. A study has been conducted to understand the reasons for food loss across stages from pre-harvest to processing. The causes can be mapped on a micro, meso and macro scale but a complex interplay of these causes asks for a systematic approach were it is important to use the right terminology and still be practical. 59 causes of food loss were placed in 4 categories (knowledge, physical, financial and institutional) entailing 30 indicators.

The second project presented focussed on the development of a practical measurement tool for food losses and waste. The tool follows the steps of the Global Food Loss & Waste Protocol (FLW Standard) and tries to fill 2 gaps within the standard. The first gap is a practical and generic scoping tool where the second gap is a database of existing FLW measurement tools. The developed methodology has been applied in several projects (potato losses in Kenya (HORTIMPACT), Tomato post-harvest losses in Nigeria (CGIAR-A4NH & Agrofair) and Rice losses in Nigeria (Cool Farm Tool).

The project Tomato post-harvest losses in Nigeria was the third presented project. An intervention has been designed, introduced and monitored. The design of the intervention was done by a Living Lab approach where potential business plans were discussed with value chain members. Commitment and the rules of the game were established. The members decided that replacing traditional baskets with plastic crates could decrease tomato losses within the chain. Within 2 trials this intervention was tested and monitored. The FLW measurement tool was tested and improved during the trials. Other aspects of the monitoring and evaluation phase were a participatory evaluation of value chain actors and the measuring of behavioural aspects with games on trust, risk attitude and collective action. The project is a good example of where technical and social aspects of an actual intervention are combined during the design, application and monitoring and evaluation phases.

---

Topics of discussion were the applicability of the tools, and availability of the protocols as well as upscaling of the projects, especially the crate intervention in Nigeria.

*Workshop 3 Food choice in a changing food environment – Africa*

Moderator: Emmy Simmons

Presenters: Thom Achterbosch, Gemma Tacken (Wageningen Economic Research)

Discussant: Akinyinka Akinyoade (Africa Study Center, Leiden University)

Objectives of the workshop:

- Inspire the consumer-oriented way of thinking about food system innovations in Africa and beyond
- Gain insight into possible consumer-oriented innovation pathways for vegetables in Africa
- Understand the consumer drivers in relation to prospective studies on changing food systems

Thom Achterbosch: Towards healthier vegetable choices in Nigeria: Changing urban consumer behaviour

Gemma Tacken: Urban food demand in Nigeria: Evolution under scenarios of food systems change

**Round 2**

*Workshop 1 Workshop Sustainable circular urban food systems*

Chair: Wim de Haas (WEnR)

Co-facilitators: Diane Bosch (WCDI), Marion Herens (WCDI), Jan Verhagen (PRI)

This workshop addressed the specific challenges of food systems in metropolitan areas. This is relevant because the world population is increasingly concentrated in cities. The discussion was conducted on the basis of five dilemmas, which were briefly explained by Mark Lundy (CIAT).

1. High tech solutions (agro food parks with intensive farming), versus low tech solutions (urban agriculture as social project)
2. The role of cities: Local governments need to play an active role by developing food strategies and food policies, versus the role of local governments is restricted to traditional core tasks like infrastructure.
3. Closing the loop: cycles of raw materials and waste need to be closed at the lowest possible level, versus closed cycles at higher levels are more sustainable and more efficient.
4. Local food policies need to address mainly the food consumers, versus local food policies need to address mainly the food retailers and food producers.
5. Cities need to be self-reliant, versus cities are necessarily part of global food systems

The discussion focused mainly on the role of local government (dilemma 2 and 4) and the technical options for circular urban food systems (dilemma 2).

On the role of the local governments was noted that local authorities generally have little interest in local food supply. It even happens that the modernization of cities leads to the destruction of the local food system (open air markets that are replaced by shopping malls). The roles of the local governments are presented as dilemma (2 and 4), but they are supplementary: local authorities should in any case ensure good infrastructural conditions, transport of (fresh) food, space for food markets, water supply and can also focus on specific subjects such as the fight against food waste, urban agriculture, etc.

On the third dilemma was indicated that it is difficult to give a general opinion. The desirability of closing circles on a low scale depends on the kind of circle: for some substances a locally closed circle is better; while others can be closed better on a high scale level. Dilemma 3 leads to

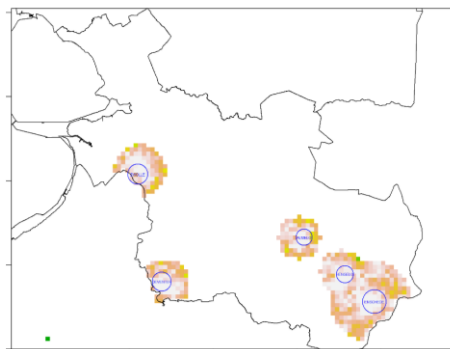
*See pictures flip charts relating to outcomes discussion*



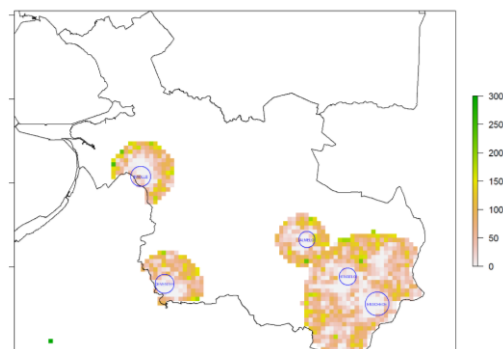
Presenters: Marijke Dijkshoorn-Dekker, Vincent Linderhof and Nico Polman (Wageningen Economic Research)

12 | Towards healthier &amp; sustainable food systems in an urbanising world | Wageningen Economic Research

developed to deal with complex issues of multiple objectives and conflicting interests in metropolitan areas. TSS is an interactive decision support approach in which stakeholders participate in order to explore and enhance their policies and transition strategies. In the Metropolitan Solution program, the main challenges were urban food security and sustainability of food systems. One important element of the TSS approach is the downscaling of long-term global and regional trend in food security to the metropolitan level.



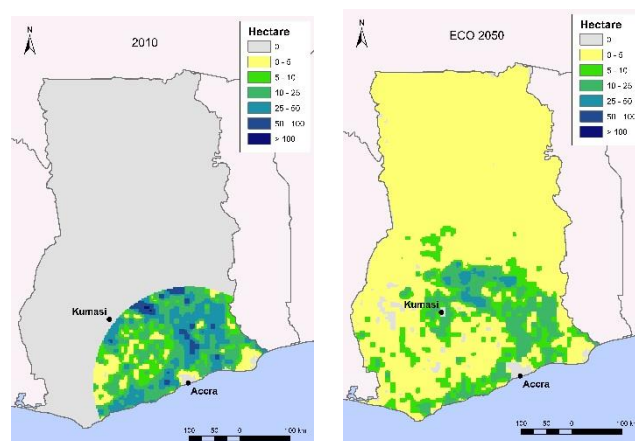
*Number of cows per km<sup>2</sup> in the current situation*



*Number of cows per km<sup>2</sup> in the future situation where population will increase with 10 percent*

The first example of the TSS approach was the sustainable food system agenda 2050 for the province of Overijssel (The Netherlands). The urgencies in Overijssel are two-fold. On the one hand, they want to make sure that their citizens have sufficient and healthy food available now and in the future. On the other hand, Overijssel is searching for a more sustainable food production system in the future. However, the choice of producing in a more sustainable way (e.g. so that greenhouse gas emissions are reduced) will affect food security and the economy. In three workshops with stakeholders from the regional government, the food processing sector, NGOs and citizens, different pathways of the food system and action perspectives for a sustainable food system agenda 2050 were discussed. The graphs show as an example the number of cows needed to fulfil the demand for dairy in five largest cities in Overijssel now and in the future when the population would increase with 10 percent.

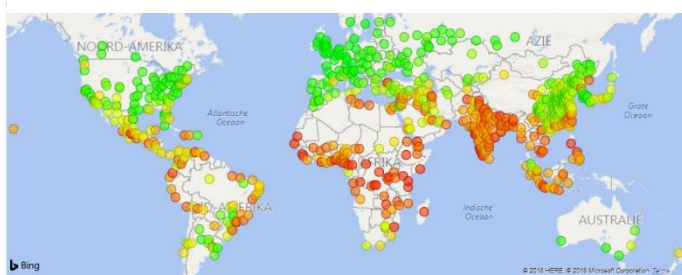
The second example was the urban food security situation in Accra (Ghana). Urbanisation is a pressing factor on urban food security, and climate change puts pressure on the agricultural production. Based on the results of the MAGNET model (a general equilibrium model for the global economy) different future pathways in terms of food production and urban food consumption were analysed. In particular, maps with virtual production circles for future food consumption for horticulture and rice were discussed in a workshop. Over time, the virtual production circles increase for all pathways, which means that more space is needed for production (horticulture), or more imports are required (rice). For policy, the issue of self-supporting is at stake.



Virtual horticulture production for fulfilling the demand for horticulture commodities in Accra and surroundings in 2010 (left) and in 2050 under the ECO scenario (right)



### Global Metropolitan Detector of food security



At the end, a tool comparing cities according to their food security risks and opportunities was presented. With a knowledge based GIS system, indicators for 850 cities worldwide were collected for the food security status, food security risk and opportunities. The indicators were merged into one indicator for food security, see map. In Europe, the US and central

Asia, most cities are green, which means that food security is high, while in Africa, India and south east Asia most cities are red, which means high food insecurity and/or uncertain food security prospects. This tool provides insight in the food security status of metropolitan areas and it is mainly meant for communication purposes with stakeholders in particular. It would be the starting point of more in-depth analysis.

#### Issues in the discussion:

- Rice is a commodity that is usually imported in Ghana? Why focus on self-supporting production in rice? The Ghanaian policy documents very much focus on self-supporting in agriculture, also for rice.
- Cassava is an important commodity in Ghanaian dishes. Could it be separated in the analysis? No, cassava is part of horticulture in the global economy model (MAGNET) we used. Although cassava might be an important commodity for Ghana, it is not different from vegetables and fruits from a world market perspective.
- Urban food security deals with a dish of different commodities, and the food system deals not only with food production. How do the virtual production maps relate to urban food security and the food system approach? The maps indicate the area needed for being self-supporting for the urban demand for commodities. It is the starting point of the discussion in which other elements of the food system should also be taken into account.

#### Workshop 3 Smart cities, an entry point to change food consumption?

Moderator: Thom Achterbosch (Wageningen Economic Research)

Discussant: Arjan van Timmeren (Delft University & AMS)

Presenters: Huub Rijnaarts, Wageningen University (Environmental Technology and AMS), Jan Willem van der Schans (Wageningen Economic Research), Sigrid Wertheim (AERES University of Applied Sciences), Elodie Maître d'Hotel & Guy Henry (CIRAD)

#### Sub-themes of the workshop:

- How do we create a smart city of urban institutions and actors to influence consumption patterns of urban dwellers?
- How to move from partial to integrated solutions?
- What is the underused potential of urban institutions (hospitals, schools, etc.) in addressing food consumption patterns?
- What is the new urban playing field (ICT, data, short chains, circularity) and what opportunities does it provide?

---

#### Contact

Wageningen Economic Research C. Plaisier  
P.O. Box 29703 Researcher Impact Evaluations  
2502 LS Den Haag T +31 (0)70 3358 330  
[www.wur.eu/economic-research](http://www.wur.eu/economic-research) E [christine.plaisier@wur.nl](mailto:christine.plaisier@wur.nl)

---